IN THE CLAIMS

Please amend the claims as follows:

1. (Cancelled)

2. (Withdrawn) An apparatus for simultaneous photodetection, demultiplexing and optical pulse generation, comprising: a traveling-wave electroabsorption modulator; and a phase-locked loop (PLL) coupled to said traveling-wave electroabsorption modulator, wherein said traveling-wave electroabsorption modulator and said PLL are configured for simultaneous photodetection, demultiplexing and optical pulse generation at a line rate of about 40 Gb/s.

3. (Withdrawn) An apparatus as recited in claim 2, wherein said traveling-wave electroabsorption modulator includes a first port coupled to the PLL and configured to output a photocurrent, and a second port coupled to the PLL, wherein the photocurrent from the first port of said traveling-wave electroabsorption modulator provides a tone to said PLL, and wherein said PLL provides a recovered electrical clock signal to the second port of said traveling-wave electroabsorption modulator.

4. (Withdrawn) An apparatus for simultaneous photodetection, demultiplexing and optical pulse generation, comprising: a traveling-wave electroabsorption modulator, and a phase-locked loop (PLL) coupled to said traveling-wave electroabsorption modulator, wherein said traveling-wave electroabsorption modulator and said PLL provide simultaneous photodetection, demultiplexing and optical pulse generation at a line rate of about 40 Gb/s.

5. (Withdrawn) An apparatus as recited in claim 4, wherein said traveling-wave electroabsorption modulator includes a first port coupled to the PLL and configured to output a photocurrent, and a second port coupled to the PLL, wherein the photocurrent from the first port of said traveling-wave electroabsorption modulator provides a tone to said PLL, and

wherein said PLL provides a recovered electrical clock signal to the second port of said traveling-wave electroabsorption modulator.

6. (Withdrawn) An apparatus for simultaneous photodetection, demultiplexing and optical pulse generation, comprising: a first traveling-wave electroabsorption modulator; a second traveling-wave electroabsorption modulator in series with said first traveling-wave electroabsorption modulator; and a phase-locked loop (PLL) coupled to said second traveling-wave electroabsorption modulator, wherein said first and second traveling-wave electroabsorption modulators and said PLL provide simultaneous photodetection, demultiplexing and optical pulse generation at a line rate of about 160 Gb/s.

7. (Withdrawn) An apparatus as recited in claim 6, wherein said first traveling-wave electroabsorption modulator includes a first port coupled to said second traveling-wave electroabsorption modulator, wherein said second traveling-wave electroabsorption modulator includes a second port coupled to the PLL and configured to output a photocurrent, and a third port coupled to the PLL, wherein the photocurrent from the second port of said second traveling-wave electroabsorption modulator provides a tone to said PLL, and wherein said PLL provides a recovered electrical clock signal to the third port of said second traveling-wave electroabsorption modulator and to a fourth port of said first traveling-wave electroabsorption modulator.

8. (Withdrawn) A clock recovery apparatus for an all-optical 3R regenerator, comprising: a traveling-wave electroabsorption modulator configured for optical clock recovery and outputting of a recovered optical clock signal to an all-optical 3R regenerator.

9. (Withdrawn) An apparatus for optical clock recovery, comprising: a traveling-wave electroabsorption modulator; and a phase-locked loop (PLL) coupled to said traveling-wave electroabsorption modulator, wherein photocurrent of the traveling-wave electroabsorption modulator is used to detect data and recover an electrical clock through the PLL, wherein the

recovered electrical clock is used to modulate the traveling-wave electroabsorption modulator and generate an optical clock at a different wavelength, and wherein said traveling-wave electroabsorption modulator operates simultaneously as a photodiode and a pulse generator.

10. (Withdrawn) An apparatus as recited in claim 9, wherein said traveling-wave electroabsorption modulator includes a first port coupled to the PLL and configured to output a photocurrent, and a second port coupled to the PLL, wherein the photocurrent from the first port of said traveling-wave electroabsorption modulator provides a tone to said PLL, and wherein said PLL provides a recovered electrical clock signal to a second port of said traveling-wave electroabsorption modulator.

11. (Withdrawn) An apparatus as recited in claim 9, wherein said optical clock is used for all optical 3R regeneration.

12. (Withdrawn) An apparatus for optical clock recovery, comprising: a traveling-wave electroabsorption modulator; and a phase-locked loop coupled to said traveling-wave electroabsorption modulator, wherein photocurrent of the traveling-wave electroabsorption modulator is used to detect data and recover an electrical clock through the phase locked loop, wherein the recovered electrical clock is used to modulate the traveling-wave electroabsorption modulator and generate an optical clock at a different wavelength, wherein the photocurrent from a first port of said traveling wave electroabsorption modulator provides a tone to said phase-locked loop, wherein said phase locked loop provides a recovered electrical clock signal to a second port of said traveling-wave electroabsorption modulator, and wherein said traveling-wave electroabsorption modulator operates simultaneously as a photodiode and a pulse generator.

13. (Withdrawn) An apparatus as recited in claim 12, wherein said optical clock is used for all optical 3R regeneration.

14. (Withdrawn) An apparatus for simultaneous demultiplexing and optical pulse generation, comprising: a traveling-wave electroabsorption modulator (TW-EAM) including a first port for an optical input, a second port, a third port for an optical output, and a fourth port; and a phase-locked loop (PLL) coupled to the TW-EAM, wherein the second port of the TW-EAM is coupled to an input of the PLL and the fourth port of the TW-EAM is coupled to an output of the PLL, wherein when the TW-EAM receives at the first port OTDM data of a first bit rate with a first wavelength and a continuous wave with a second wavelength, the TW-EAM produces at the second port a photocurrent having a tone of a fundamental frequency determined by the first bit rate, wherein in response to the photocurrent, the PLL generates an electrical clock with a first frequency that is supplied to the fourth terminal of the TW-EAM, and whereby wherein the third terminal of the TW-EAM generates demultiplexed data of a second bit rate with the first wavelength and an optical clock with the first frequency and the second wavelength.

15. (Withdrawn) An apparatus as recited in claim 14, wherein the TW-EAM functions as a photodetector and a modulator.

16. (Withdrawn) An apparatus as recited in claim 14, wherein the first bit rate of the OTDM data is of about 40 Gb/s.

17. (Withdrawn) An apparatus as recited in claim 14, wherein the first frequency is determined by dividing the fundamental frequency by N (where N is a natural number larger than 1).

18. (Withdrawn) An apparatus as recited in claim 17, wherein the second bit rate is determined by dividing the first bit rate by N.

19. (Withdrawn) An apparatus as recited in claim 14, wherein the PLL includes a band-pass filter configured to eliminate the tone.

20. (Withdrawn) An apparatus defined in claim 14, wherein the PLL includes a voltage controlled oscillator with a same frequency as the first frequency.

21. (Withdrawn) An apparatus for optical clock recovery, comprising; a traveling-wave electroabsorption modulator (TW-EAM) including a first port for an optical input, a second port, a third port for an optical output, and a fourth port; and a phase-locked loop (PLL) coupled to the TW-EAM, wherein the second port of the TW-EAM is coupled to an input of the PLL and the fourth port of the TW-EAM is coupled to an output of the PLL, wherein when the TW-EAM receives at the first port OTDM data of a first bit rate with a first wavelength and a continuous wave with a second wavelength, the TW-EAM produces at the second port a photocurrent having a tone of a fundamental frequency determined by the first bit rate, wherein in response to the photocurrent, the PLL generates an electrical clock with a same frequency as the fundamental frequency and the electric clock signal is supplied to the fourth terminal of the TW-EAM, wherein the third terminal of the TW-EAM generates an optical clock with a same frequency as the fundamental frequency.

22. (Withdrawn) An apparatus defined in claim 19, wherein the TW-EAM functions as a photodetector and a modulator.

23. (Withdrawn) An apparatus defined in claim 19, wherein the first bit rate of the OTDM data is of about 40 Gb/s.

24. (New) A traveling-wave electroabsorption modulator (TW-EAM) comprising:

a semiconductor optical waveguide for an optical signal and traveling-wave electrodes for an electrical signal, in which the optical waveguide and the electrodes are closely positioned so that at least one of (a) an electric field applied to the electrodes varies an absorption edge wavelength of the optical waveguide or (b) a traveling wave electric field is produced at the electrodes when light incident on the optical waveguide is absorbed;

a first electrical port configured to receive a first electrical signal;

a first optical port configured to receive a first optical signal;

a second electrical port configured to output a second electrical signal extracted by absorbing the first optical signal; and

a second optical port configured to output a second optical signal obtained by modulating the first optical signal based on the first electrical signal.

25. (New) A TW-EAM as defined in claim 24, wherein one of the first optical port and the second optical port receives a third optical signal, and the optical port which does not receive the third optical signal outputs a fourth optical signal by modulating the third optical signal based on the first electrical signal.

26. (New) A TW-EAM as defined in claim 24, wherein the first electrical signal is obtained by electrically processing the second electrical signal.

27. (New) A TW-EAM as defined in claim 26, wherein the first electrical signal has a fundamental frequency or one of the subharmonic frequencies of the second electrical signal.

28. (New) A TW-EAM as defined in claim 25, wherein the second electrical signal has a fundamental frequency that is the same as that of the first optical signal, and the second or the third optical signal has a frequency that is the same as that of the first electrical signal.

29. (New) A TW-EAM as defined in claim 24, wherein the second electrical signal is a photocurrent induced by electroabsorption of the first optical signal.

30. (New) A TW-EAM as defined in claim 29, wherein the first electrical signal is a clock signal having a fundamental frequency or one of the subharmonic frequencies which is regenerated from the photocurrent.

31. (New) A TW-EAM as defined in claim 24, wherein the first optical signal has a line rate on the order of 40-160 Gb/s.